

NASA Chat: Geminids Meteor Shower 2014
Experts Dr. Bill Cooke, Rhiannon Blaauw
December 13-14, 2014

rhiannon_blaauw: Good evening! Unfortunately we are clouded out here currently which is why you won't be seeing anything in the feed right now, but hopefully it will clear off later. We are ready to take your questions now! And we hope you are all having clearer skies than us. ☺

klee: Hi, is the Geminids meteor shower seen across the nation?

bill_cooke: Yes, it is.

klee: Can I see it from Brooklyn, NY?

bill_cooke: Yes, if the sky is clear.

Guest: I can't seem to catch the live video on Ustream...I'm in South America: am I connecting at the right time?

bill_cooke: Few technical difficulties with the stream - it is being worked.

Jerry: My birthday is December 14, and I've always wondered how often does the Geminids shower occur on the 13/14th. Every year, 2 years, 3 years?

bill_cooke: Every year

don: can we see this meteor shower in calf

bill_cooke: Yes

faye: when is the peak hours for waco?

bill_cooke: About 1:30 - 2 am.

Jgrasham: I saw that the Geminids first appeared in the early 19th century. Any guesses about how long they will last?

rhiannon_blaauw: The Geminids are a relatively young meteor shower, first recorded in the 1860's. The rates have been gradually increasing in strength over the years and now it is one of the most consistently impressive meteor showers each year... however in a few centuries, Jupiter's gravity will have moved the stream away from Earth enough that we will no longer see the shower.

Eddcast: Could it be visible if I live in the suburbs?

bill_cooke: Yes, if no bright lights around.

Jerry: Can I see it from Manhattan, KS?

bill_cooke: If the skies are clear, yes.

Alsniper211: has the coverage on ustream already started?

rhiannon_blaauw: I apologize, we are having technical difficulties... however if it makes you feel better, it is cloudy here anyways. We are hoping it will clear off later.

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Don: what time is the peak of the shower

bill_cooke: 1:30 - 2 am local time.

Patricio: Hello there , I live on the US east coast .. any idea if thats a good location observationwise??

rhiannon_blaauw: A good location is away from city lights. ☺

elfer: can you take pictures from satellites and post them? of meteorites?

bill_cooke: Satellites aren't set-up to do that.

pipetectonic hi, im from colombia. can i see it from here?

bill_cooke: Yes

nadim: hey any ideas if there is any kind of gathering in montreal to watch the meteor shower tonight ? :)

rhiannon_blaauw: Not sure, perhaps a local university or local astronomy club will have organized something, but we don't have information on that.

skychick: We are in Williamsburg, Virginia and spent about an hour outside and saw about 20 meteors. It is a clear night here.

bill_cooke: Congrats!

Chiqui: Hello. Im in Buenos aires, Argentina. Is this possible to see it here? The sky is clear.

bill_cooke: Yes, the rates will be lower.

HabemusPapam: How many meteors per hour?

rhiannon_blaauw: If your skies are clear and dark, you can see up to 120 per hour in the northern hemisphere. Rates will be lower in southern hemisphere, though not seen at all in Antarctica.

Jaysmomma: would like my daughter to see this is there a best time to take her outside, (We are in VA)

bill_cooke: After midnight, 1-2 am will give best rates.

T_BOLT: was oy for 1 1/2 hr and saw only 10 2 of which was nice ones

rhiannon_blaauw: Fantastic! We love hearing good reports.

Devansh_Shukla: Hi, is the Geminids meteror shower seen across the world?

bill_cooke: Yes.

Andy: Just stepped outside in Salisbury, MD and saw some already.

rhiannon_blaauw: Awesome!

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Pipetectonik: hi, im from colombia.. can i see it from here?

rhiannon_blaauw: Yes, you can see it in Columbia if your skies are clear.

Akkush: Is it coming from a comet?

bill_cooke: Geminids originate from an asteroid-3200 Phaethon.

Alsniper211: what about southern ontario, canada?

bill_cooke: Yes, if the skies are clear.

Sssss: can it be seen from miami, fl?

bill_cooke: If you have clear skies and are away from city lights.

Pipetectonic: can i see it from colombia?

bill_cooke: Yes.

Kirito-kun: Can I see it from South America?

bill_cooke: Yes.

CodyMichael1234: What time does this start?

rhiannon_blaauw: The shower is already going on, but rates will be highest around 2 am local time.

jgrasham: Which quadrant of the sky should we focus on (if we have clear sky, of course)?

bill_cooke: Lie on your back and look straight up.

Rachel_Oswald: Will this be visible tomorrow night as well?

rhiannon_blaauw: It will be, though rates will be lower.

Hihocheerio: How large are these meteors?

bill_cooke: Most are about a millimeter in size.

waya7: im in n.e. tn i seen a few

bill_cooke: Congrats!

RichP: i thought its peak will be right before dawn? which is correct from eastern?

rhiannon_blaauw: After 1:30 local time until dawn will be the best time to see Geminids, though the shower is already going on.

jake54: Super excited for the shower! I got a warm blanket, comfy lawn chair, and some snacks time to settle in :)

bill_cooke: Sounds like you are ready to observe meteors!

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yatish123: where can we see the shower online ?

bill_cooke: Slooh also has a live feed.

Jaysmomma: Went outside for a few moments with my little one and saw a few, this is the first meteor shower she has been able to see

bill_cooke: Congrats!

Jared40Handz: when does it start

bill_cooke: Already started!

Nicolas: Can i see the meteor shower in bogota?

bill_cooke: Yes!

skychick: At what speed do the meteors hit the atmosphere?

bill_cooke: 78000 mph.

SnapOn86: Why are we not seeing much on the live Ustream below this chat box?

bill_cooke: They are having technical trouble - working on it.

akkush: do they start out bigger than a millimeter?

bill_cooke: Nope - there are a few that are centimeter size but Geminids burn up about 50 miles above your head.

Jgrasham: The Nasa blurb said that they were ice fragments. How do you know this?

rhiannon_blaauw: Meteor showers come from comets or asteroids. Comets are 'dirty snowballs', a mixture of ice and rock. So most meteors are a mixture of these ice and dust/rocks with some organic chemicals. Geminids are from 3200 Phaethon, which is an asteroid (more dense than a comet) and thus Geminids are more dense than other meteoroids from comets.

Jgrasham: If they are so small (a millimeter), how are they able to make such a bright flash?

bill_cooke: Because they are moving at 78000 mph.

Gejb3: I can't see it from indiana tonight will i be able to see it at all the next couple of days?

bill_cooke: Yes, over the next couple of days.

Arcderp: Would it be bright enough for me to photograph with a low end DSLR?

rhiannon_blaauw: Meteors can be photographed if you set the camera to take a long-exposure image (1-10 minutes) and open the iris all the way.

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makins117: Cloudy here in the Chicago area so no go for me, but in the meantime I have a question. Since the Earth passes through the particulates of the comet/asteroid annually is there any chance that at some point the orbits could meet and there be impact with the Earth? How often does the comet/asteroid fly by as it were?

bill_cooke: No - will not impact the Earth.

Jessikweh: I watched this in Australia last night, it was great! Unfortunately I couldn't see a lot of it though since a giant cloud ruined my fun

rhiannon_blaauw: We are glad that you saw some!

jake54: do the meteors ever hit earth?

bill_cooke: There is no record of a Geminid making it to the ground

elfer: have you guys ever met chris hadfield?

rhiannon_blaauw: I have not met Chris Hadfield.

Tlanta: When will the Ustream feed start? All I see is the 2014 Lunar Eclipse below

bill_cooke: They are trying to get things straightened out.

Nicolas: are the meteors already passing colombia or bogota?

rhiannon_blaauw: You can see meteors from those locations if you have clear and dark skies.

TNMeteor667: You guys could get feed perhaps from Kennedy Space Center? Or from someplace in New Mexico or Arizona?

bill_cooke: KSC and other Centers don't have meteor cameras.

Arnoldgunawan@ymail.com: can i see the meteor shower from Malaysia ? ...

bill_cooke: If it's night time.

arcderp: too bad it's kinda cloudy in my part of nj

rhiannon_blaauw: That is frustrating! We feel your pain.

jake54: if a meteor were to hypothetically touch ground onto earth's surface what would happen? should I be fearful?

bill_cooke: A meteorite is a small piece of rock, so it simply lay on top of the ground. Not very scary.

Peter: How do we know that the debris won't have an impact on our satellites, telescopes and other equipment?

bill_cooke: There's always a slight chance a satellite could be hit.

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7eventy2wo: how are the rates for Nova Scotia?

rhiannon_blaauw: The rates should be good for Nova Scotia (up to 120/hour at peak time) if your skies are dark and clear.

Umango: Everybody is saying 3200 Phaethon is an asteroid but the nasa page says it is an extinct comet. I am confused. What is it technically?

bill_cooke: Technically 3200 Phaethon is an asteroid. Some people think it may have been a comet and what we're seeing now is the rocky core that's left after all the ice is gone.

Margaret_: Where I can see this event??

bill_cooke: Go outside. If it's dark and look up.

Jerry: Typically how close to the surface do the meteors reach before completely burning up?

rhiannon_blaauw: Geminids usually burn up (ablate) by 50 miles above the Earth's surface, but they have been recorded as low as 22 miles.

Elfer: if a satellite was hit, would it make much damage? are satellites bullet proof?

bill_cooke: Satellites are shielded against meteoroids and orbital debris.

jake54: how are the rates for northern massachusetts?

bill_cooke: Have no idea - I'm in Alabama.

Badriri: Can I see the metors in North West of UK?

bill_cooke: Yes, if the sky is clear and dark.

Wbarno: How do you determine which asteroid/comet created the meteor shower?

bill_cooke: The meteors have orbits that are very similar to the comet or asteroid.

rose70: could a more powerful telescope see this through the cloudy weather

bill_cooke: No telescope can penetrate clouds - no matter how big.

Badriri: What is going on with the Live Steam?

bill_cooke: Technical problems- they are working it.

RichP: too bad u have to answer the same questions more then once lol hope your having a good night

bill_cooke: I am having a good night - thank you!

Jeff: How about SW Florida rates per hour?

bill_cooke: I'm not in SW FL, but I would imagine the rate is the same as the rest of the East Coast.

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T_BOLT: what make the large ones greenish in color

bill_cooke: Ionized oxygen.

Elfer: if you were to drive in a car, straight up, from earth, into the sky, how many miles would you have to drive to reach space?

bill_cooke: Technically 60.

kitchen_wolf: we are in S. Central Texas. We saw over 20 from 830 central to now. Very good show!

bill_cooke: Congrats!

Honorupton: will i be able to see it in maryland

bill_cooke: Yes.

Jessikweh: How far away from earth are these meteors?

bill_cooke: Geminids burn up about 50 miles above your head.

Badriri: What time will I see them in North West UK approx?

bill_cooke: Throughout the night - best rates around 2 am.

CodyMichael1234: Can i see from ohio what would be the best time to see it??

bill_cooke: After midnight.

Iambeckah: will you be able to see this well or poorly in southwest florida? or should i just go to sleep?

bill_cooke: If the sky is clear and dark - you should have a good show!

Snouflejk: Just got home from a night stroll. Freezing here in sweden but i got to see about 20+ of them when the sky was clear for 30 min

bill_cooke: Congrats!

Skychick: Does the ISS see the meteor shower?

rhiannon_blaauw: Yup! The fun thing is... astronauts on the ISS actually have to look down to see the meteor shower instead of up!

Jgrasham: Does going through a meteor shower have any effect on weather?

bill_cooke: No.

honorupton: what time should i be able to see it on the east coast

bill_cooke: Throughout the night.

Ehentalix: People are getting antsy. When will the uStream be up?

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bill_cooke: Have no idea.

Gabster: Can anyone see anything around Ohio?

bill_cooke: If the weather is clear – yes.

TNMeteor667: On Friday morning, I did see a large blue-ish Geminid at sunrise here in Nashville. Most impressive and largest meteor I have ever seen (about 7-8mm of my view). That was my inspiration for seeing 6 others last night, and watching this stream tonight! Gemini is my lucky constellation; if you see any tonight, it's probably because I'm watching. ;)

bill_cooke: Cool!

7eventy2wo: What form of education do you have? I'm in my first year of astrophysics.

rhiannon_blaauw: I have my undergrad in astrophysics and masters in astronomy (specializing in meteors). Bill has his Ph.D. in astronomy. So you are on the right track ☺

RichP: is it technical problems or cloudy?

bill_cooke: Both.

Sammy: I'm sure this question has been several times, anyone know what's going on with the live feed?

rhiannon_blaauw: Troubleshooting it... hopefully will be up soon.

Nicolas: in what time is best to see the meteor shower in bogota?

bill_cooke: After midnight.

Jim54: Since it is cloudy at Marshal, will they be using a different telescope?

bill_cooke: Nope.

iambeckah: Will there be a recorded video of the livestream so there are chances to watch it tomorrow if I fall asleep?

bill_cooke: If they can get it working – yes.

Gabster: What are the rates of the East coast?

bill_cooke: Up to 120/hr - around 2 am.

Saruh: Can I see them from my window in New York? Its way too chilly to be outside.

rhiannon_blaauw: In theory, yes, though you are limiting your field of view. The best way to see them is to lie on your back and take in all the sky (also try to get away from city lights).

caius_Erickson: What time will Canadians in Ontario be able to see it?

bill_cooke: Throughout the night - best rates around 2 am.

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SnapOn86: Do times like this affect aviation traffic at all?

rhiannon_blaauw: No. The meteors burn up much higher than the altitude that planes fly.

Nico: Which is the best time to see the meteors in bogota?

bill_cooke: After midnight.

Starzzz: What time would it be best to see it from Massachusetts?

bill_cooke: After midnight.

Ricardo: in Peru, can be seen?

bill_cooke: Yes, it can be seen in Peru.

Joy: When can I see at san diego??

bill_cooke: Throughout the night if it's clear and dark.

Josh: Just outside of Chicago, can not even see the moon. What are the chances of us being able to see it and when are the chances the best?

bill_cooke: 0.

Antimjain: Can we get it see it in Nashville TN, USA ? If yes what time.. ?

bill_cooke: Best rates after midnight.

Hugohmm: What time i will see them in Lima, Peru?

bill_cooke: After midnight.

lambeckah: Can I see this from Florida - and when would be best to see it?

bill_cooke: Yes - best rates after midnight.

Static: I just came inside. A few really good ones visible here in suburban MA.

rhiannon_blaauw: Awesome! Glad you are seeing some 😊

Alsniper: i have seen you say best rates are around 2am, is that local time to where everyone is, or is that for alabama and area

bill_cooke: It is local time where YOU ARE.

c3po: Hi were in the netherlands. and we saw a whole swarm . in a v like a bird flock, they were a bit orange brownish. in a very straight angle.

bill_cooke: Congrats!

Atcufrog: Hi I'm in north central Texas and think I saw one about 10 minutes ago. Is that possible?

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bill_cooke: Absolutely!

TARSandCASE: Do we know how long ago 3200 Phaethon went "extinct"?

bill_cooke: At least a few centuries ago.

badriri: The sky keeps lightning up in random places, are those the meteors?

rhiannon_blaauw: Meteors are streaks of light in the night sky... so if that's what you are seeing... yup!

HKHoang: Will this happen every year?

bill_cooke: Yes.

TNMeteor667: What position is Gemini in right now over Nashville? I have seen one near the Big Dipper, but another from next to the Little Dipper.

bill_cooke: Gemini is over in the best - but Geminids can appear anywhere in the sky, including in the Big Dipper.

Joy: what time would it be best to see it from San diego??

bill_cooke: After midnight.

Chris: Do the Geminids every produce a "storm"

bill_cooke: No.

thirdleggreg: Is the best time to watch the meteor shower after midnight in Morgantown WV?
Sidenote- I am not married to me sister.. HAHA.

bill_cooke: Yes.

Puzzling_Pete: What is the magnitude of Phaethon?

rhiannon_blaauw: Phaethon has an apparently magnitude of about +16 right now.

RichP: Thank you for your time this is very generous that you do this and help people its not everyday people can ask NASA lol so thank you

rhiannon_blaauw: You are so welcome!! ☺

Nicco_C: when will the clouds clear up in philly?

bill_cooke: You need to talk to your local weather man.

Andy: Tho ones I've seen so far were moving in the same direction. Do they always move in the same direction, or can they come from any direction?

bill_cooke: They should appear to come from the constellation of Gemini

Puzzling_Pete: Can Phethon be seen with binoculars?

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bill_cooke: No - requires a telescope.

Kevin: what about mississippi

bill_cooke: What about it?

kitchen_wolf: do any of the other planets interact with the geminids?

bill_cooke: The Geminid stream passes close to the Earth's orbit - it does not produce meteor showers on any other planet.

Skychick: Does the meteor shower pose any danger to the ISS, either short term or long term?

bill_cooke: No - ISS is armored.

Klee: what time can i see the showers in brooklyn?

bill_cooke: Best rates after midnight - be sure you get out of the city.

Denise: I'm in Brazil and the night is beautiful

rhiannon_blaauw: Glad for you! Can you send your clear skies our way? ☺

Nicco_C: When will the best time to see the comets?

bill_cooke: If talking about meteors - after midnight.

Mark: Very clear cold night with calm sky in Jacksonville Florida. I've seen a couple already despite city lights.

bill_cooke: Congrats!

Matt: can i see this shower from a city? Any suggestions to get a clearer view?

bill_cooke: You will be able to see a few of the brighter ones.

Nicco_C: when did the comet become extinct?

bill_cooke: Several 100 years ago.

Static: What is the next night sky event to look forward to? Specifically something that can be seen from New England?

rhiannon_blaauw: The Geminids can be seen from New England. There are a couple lunar eclipses next year (April 4 and September 28), and the next good meteor showers will be in April (Lyrids) and May (Eta Aquariids).

makins117: Are most of the meteor showers we see throughout the year from comets that passed through centuries ago? Are there any "current" comets that pass by that are creating future meteor showers?

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bill_cooke: First ? - yes. Second ? – sure. Halley and other comets leave behind debris we will run into in the future.

Umango: Would meteor shower's peak rate be different at different places on earth? Assuming it's night time, of course.

bill_cooke: The Geminid peak is broad, so it is more a function of time, rather than where you are.

mondo1999: can the crew of the iss see the meteor shower?

rhiannon_blaauw: Yup! They can see the meteor shower by looking down towards the earth because they orbit above the earth's atmosphere. They have sent us images of several meteor showers in the past, from their perspective.

Arby: where is 3200 phaeton now?

bill_cooke: Don't know, you can find that out by going to the [JPL Horizons Website](http://horizons.jpl.nasa.gov/).

TNMeteor667: What is your recommended distance to be away from city lights to best view a meteor shower?

bill_cooke: You need to get somewhere where you can see the stars and the Big Dipper.

DRHumpCanada: Do we know what the meteors are made of?

rhiannon_blaauw: Ice and dust. Geminids are more dust/rock than ice, though, and are more dense than most other meteoroids.

Thirdleggreg: What about West By God Virginia

bill_cooke: If you have clear skies, you should be seeing Geminids.

mondo1999: can we see the same shower each year?

bill_cooke: Yes, the Geminids occur around this time every year.

Kevin: can we see the meteor shower?

bill_cooke: If it's clear and dark where you are – yes.

saruh: can you still see a meteor shower if its cloudy? i mean, the meteors are flaming, right?

bill_cooke: Yes, but they are burning up above the clouds, so you can't see them.

geminis83: hello Bill nice to see you again!! I love these chats.....whats the activity lookin like so far? im in southern colorado saw a few in about 10 minutes watching

bill_cooke: Rates appear pretty good.

Francissfulgencio: about what time do you guys think it'll show in Chicago?

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bill_cooke: Geminids are going on now - you should be able to see them if your skies are clear.

geminis83: What time is the exact peak hour? GMT is fine...i know we go thru the thickest part of debris at a certain time every year with this shower so can Bill or Rhiannon answer this please?

rhiannon_blaauw: The best rates will be 2 am to dawn, when the radiant is highest. However the 'true' peak of the shower is December 14, 12:00 UTC (which is daylight, for us). By that I mean that is when we will pass through the most dense part of the stream, however that is not necessarily when your rates will be highest.

T_BOLT: What part of sky the live feed in point at

bill_cooke: To the NW.

Bjorrek: so around or after midget we can see alot more of the geminids? [from south carolina]

bill_cooke: Yes.

suzieq: we just saw 2 go by here in St. Petersburg, FL

bill_cooke: Congrats!

Anjumfar: how can we see the meteor shower in missouri??

bill_cooke: If it is clear, go outside, wait a few minutes for your eyes to adjust to the dark and look up.

AstronomyGuy: Clear skies here in TN. I have seen 11 in the past 20 minutes.

rhiannon_blaauw: That's awesome!

Sbkimx: When will be a good time for viewing in Virginia? What part of the sky is the best to look towards?

bill_cooke: Look straight up after midnight.

Edier: hello what time you can view the meteor shower in Bogota Colombia.?

bill_cooke: All night- best rates after midnight.

Iggy2000: Seeing them in Virginia now... impressive!

bill_cooke: Congrats!

Rashmi: Are the meteors visible? Will it be visible over india?

bill_cooke: Not in the day time

stars101: whens the best time to see the meteor shower?

bill_cooke: After midnight.

TNMeteor667: Can the light from meteors be seen through thin or small clouds?

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bill_cooke: Not unless it's a really bright one - which is rare.

TheRileesOfYorktown: Yorktown, Virginia is having some activity. Light pollution doesn't help but we saw 4 or 5

bill_cooke: Congrats!

Umango: What is the rate at which Phaethon 3200 burns out from the sun? How long before it won't produce meteor showers anymore?

bill_cooke: Have no idea. No one knows.

Bjorrek: this will be my first meteor shower ive ever seen x.x kinda nervous due to there being a street light in front of my house and the darkest place is my back yard with the exception of the neighbors porch light

bill_cooke: You need to find the darkest place you can.

DRHumpCanada: What is the difference between the classifications of a comet, meteor and meteoroid? Sorry, am a astro-newbiw! :)

rhiannon_blaauw: Good questions. A comet is a 'dirty snowball' - a bigger object (often several kilometers in diameter or larger) which is orbiting the sun and depositing particles. Those particles are what we call meteoroids. Smaller particles that have been released from comets and asteroids. If that meteoroid comes in contact with the Earth's atmosphere and starts burning up, that is considered a meteor. If the meteor is big enough/dense enough to make it through the Earth's atmosphere to the ground, it is considered a meteorite.

Suzieq: I may have missed the info, but about how far away are they coming from?

bill_cooke: Geminids burn up 50 miles above your head.

mjcrowley4: seen a few up in Rhode Island already

bill_cooke: Congrats!

TNMeteor667: Big, bright orange-white meteor just lit up the clouds nearby in Smyrna, TN!

rhiannon_blaauw: Awesome!

CodyMichael1234: On the live stream is the white dots is that the stars or the shower??

bill_cooke: White dots are stars.

geminis83: Thank you Rhiannon just the answer I was looking for.....im gonna light the fire and go brave the cold in Colorado, we have a storm coming tomorrow am so its getting really chilly already but id survive the arctic for Geminids!! lol

rhiannon_blaauw: You are welcome. ☺ And I hope you get to see many Geminids!

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mondo1999: good night!! i want to know what is the difference between a meteor, a comet and an asteroid?

bill_cooke: A meteor is the streak of light produced when a space rock burns up in the atmosphere.

jasonandersen44: Where is the live feed exactly?

rhiannon_blaauw: The camera is located here at Marshall Space Flight Center in Huntsville, Alabama!

Peter: assuming mars had an atmosphere once upon a time, were there similar phenomena there?

bill_cooke: Yes, there were and are meteors on Mars.

dP: whatever is happening tonight, will that cause any damage to our body due to high radiation/cosmic rays if we have our cellphones next to us. I've been receiving bunch of messages from friends saying not to keep cellphone next to me tonight from 12:30 to 3:30

bill_cooke: No, there is no need to worry.

AstronomyGuy: What kind of scope and camera is the feed coming from?

rhiannon_blaauw: A black and white low-light level video camera with a 25 degree field of view. It is pointing a bit east of north.

Momotarou: sorry to ask such a question but what are we looking for in the live stream? i can't seem to see much..

bill_cooke: You are looking for a streak of light that will flash across the video.

Kevin: I was inquiring if I can see the shower from mississippi. My son is fascinated with science and is eager to see it. I asked if we could see it from mississippi.

rhiannon_blaauw: Yup! If your skies are dark and clear.

CodyMichael1234: What does the shower look like on the stream??

bill_cooke: You are looking for streaks in the video - those will be the meteors.

Dan: So on this camera, it would look like a trail of light, a line?

bill_cooke: Yes.

momotarou: when is the next time we can expect a similar event to take place?

bill_cooke: Next really good shower is the Perseids in August.

DRHumpCanada: There's one particular star on the top of the live feed that appears to be pulsating... do you happen to know if that is a true pulsar or is it just the effects of the live feed that makes it look like that?

bill_cooke: It's a normal star and its twinkling.

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HKHoang: How hard would it be to take a photo of a the shower:

bill_cooke: If you have a DSLR, set it up on a tripod and take a time exposure.

TNMeteor667: Clodus are breaking up here quite a bit; gonna go out and hunt down any meteors I can catch on my cheap camcorder! C'ya in a bit! Good luck on finding Geminids tonight! :)

bill_cooke: Good luck!

CDP: does a meteor have rays? cuz i got a text saying that there will be high radiation and strong cosmic rays and to turn off my cell phone and keep it way from me from 12am-3:30am this evening.

bill_cooke: No - a meteor is not radioactive.

Atcufrog: This is a great experience. Thanks to all of you for being there and answering our questions.

bill_cooke: You're welcome!

Bjorrek: bill_cook well the darkest place is a empty houses yard next door. but its not 100% safe. also anyone got fb? add me at leif stormrider makes it easier to talk about this subject

bill_cooke: You need to be safe.

mondo1999: which other planets have meteorites?

rhiannon_blaauw: All planets with surfaces could have meteorites. Meteoroids are impacting all planets, not just Earth. The gas planets don't have a surface for the rocks to land on (the definition of meteorites), they would just fully ablate in the thick atmosphere, so that is why I say that planets with surfaces could have meteorites.

mondo1999: how can you know if a meteor is radiactive or not ?

bill_cooke: We know - we have handled many meteorites and none of us are glowing in the dark.

Thirdleggreg: I hear pluto is nice this time of year..

rhiannon_blaauw: Will have to take your word for it... have never been there myself ☺

RichP: now when a star is twinkling that is the atmosphere right i herd that means its not a good night to look at start theu a telescope is that right?

bill_cooke: Correct, but we are looking for meteors, not stars.

brian22n: is there any tips for viewing this metoer shower ina city? Its partly cloudy where i live, also where is the constellation gemini located?

bill_cooke: Minimize the amount of light and Gemini is currently in the east.

Aalok: Do I need a telescope or will the shower be visible to the naked eye?

bill_cooke: You don't want a telescope just use your eyes.

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b4evrwld: Do you have clear skies in Huntsville/Marshall?

bill_cooke: Nope.

TNMeteor667: Beautiful Geminid meteor just flashed on screen! Can y'all tell if there will be more like that soon(like by some scanners or some laser stuff you have)even despite the passing clouds?

rhiannon_blaauw: We have seen a few meteors in the feed now!

MrWhite: I was just out side with my family and seen about 15 in an hour in East Tennessee... has the shower peaked or should I expect more later?

bill_cooke: Expect more later if sky remains clear.

Alsniper: are there many events like this where streams are provided and questions are answered?

bill_cooke: Only for the Geminids and Perseids.

navyvet1974: Getting a good show here just south of the Anniston Airport. Skies are clear and glad the military aren't flying tonight! Just saw 6 in about 5 minutes. Waiting for peak time to arrive!

bill_cooke: Congrats!

geminis83: what is the next predicted meteor storm or outburst? Im patiently waiting for leonids to come back in about 20 years lol..best shower ever 2001 Leonids

bill_cooke: Perseids should outburst in 2016.

Aalok: When will the meteor shower be visible on the west coast?

bill_cooke: It is visible now - best rates after midnight.

Smokejumper: About how many meteors will touch down tonight?

bill_cooke: Zero - Geminids burn up before reaching the ground.

Dan: When is peak time? And is it only around the star Castor in the Gemini constellation?

bill_cooke: Around 2 am. You want to look away from Gemini - don't look at Gemini.

stars2: when are the best rates in Ontario Canada?

bill_cooke: Around 2 am local.

Umango: Not a question. Just wanted to thank you guys for being awesome and doing this chat.

bill_cooke: You're welcome!

Chrismcv: what about iowa

bill_cooke: After midnight.

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stars2: What am i looking for in the feed?

bill_cooke: A quick streak of light.

kimk10: hwo do you predict meteor shower

rhiannon_blaauw: When a comet or asteroid goes around the sun, it leaves a stream of debris. When Earth passes through this stream of debris, we have a meteor showers. Thus to predict the rates or timing of a meteor shower, we run a simulation of those particles coming off the comet/asteroid, orbiting around the Sun, any gravitational effects on the particles from planets, and estimate how many will collide with the Earth's atmosphere when it passes through that stream of debris, and what time.

CodyMichael1234: Whens the best rate for Kent Ohio?

bill_cooke: Around 2 am.

Suzieq: is the bright star on the upper left side of the feed the north star by chance, since it is the brightest?

bill_cooke: No - it is not the North Star.

Derp: When does this start?

bill_cooke: The meteor shower is already underway.

DRHumpCanada: Hope you both are heavily caffeinated! Just curious as to which shower you were most impressed with over your careers.

bill_cooke: The Leonids.

kimcam79: Do you know when the best time to watch will be in Texas?

bill_cooke: After midnight.

stars2: will the line be as thick as the stars we see currently?

bill_cooke: Yes.

Dan: @suzieq It's the star Castor most likely. Am I correct?

bill_cooke: Nope - the camera is pointed nw, not east

walter: WHAT TIME BEGINS IN PERÙ ?

bill_cooke: It is already going on in Peru.

AstroRob: Where is this feed coming from?

bill_cooke: Huntsville, AL

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kitchen_wolf: Is there anything in the debris field large enough to be tracked or impact with the ground?

rhiannon_blaauw: The cameras we have track meteors that are caused by millimeter-sized meteoroids. If you mean track them before the Earth's atmosphere, we do not do that at the Meteoroid Environments Office. But in general, most of these Geminids are caused by particles that are too small to be tracked with by any equipment before colliding with the Earth's atmosphere.

DRHumpCanada: Bill: Why the Leonids? What made it so impressive?

bill_cooke: Because the storms were very impressive, fantastic rates.

gemini83: Bill the 1999,2000 or 2001 Leonids? which was your fav storm?

bill_cooke: 2001 Leonids.

Jmahon: do other planets get meteor showers like this? Would they see the same ones we do? or their own?

bill_cooke: Mars does, but other planets have different meteor showers.

brian22n: When are the best rates in El paso, TX

bill_cooke: Around 2 am.

Eddcast: Im in Bristow, VA. I already saw a couple good ones! This is my first seeing a meteor shower! I am excited :D

bill_cooke: Congrats!

Ayalalui: WHAT TIME BEGINS IN Paraguay?

bill_cooke: It is going on now!

stars2: Arent the meteors radiating from south east?

bill_cooke: They are radiating from Gemini.

Dan: If we look straight up, will we see it? Or in a specific dirrection?

bill_cooke: Look straight up.

Kevan: the Ustream feed is live?

bill_cooke: Yes.

CodyMichael1234: When do you think the leonids are gonna happen?

bill_cooke: In about 20 years there will be another storm.

MoneKnows: What is the best time to watch in South Florida?

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bill_cooke: After midnight.

Amitb: what about vancouver bc?

bill_cooke: After midnight.

Quieder: I caught the perseid shower a couple of years ago, it was awesome

rhiannon_blaauw: My favorite meteor shower that I have watched was the Perseids in 2012. ☺

stars2: Will i be able to see it with a misty sky?

bill_cooke: Not much.

gemini83: Ive probably asked that question during every chat, always nice to remember the 2001 Leonids tho, rates where I was were 3000+ per hour from what Ive read, it was WAY too many to count, everywhere you looked there was one or the trail or smoke from another, pure insanity !! most amazing event in my lifetime

rhiannon_blaauw: I have heard amazing stories of the Leonid storms!

HKHoang: What are the leonids? Are they like the Geminids?

bill_cooke: The Leonids are a meteor shower caused by debris from Comet Tempel Tuttle. They occur in mid November.

mondo1999: is the meteors shower visible in the whole planet??

rhiannon_blaauw: Except the Antarctic! Anywhere that the constellation Gemini can be seen, the Geminid meteors can be seen.

gemini83: Will there be a transcript of this chat and where can I locate previous transcripts from over the years?? any available?

bill_cooke: There will be a transcript of this chat - don't know where the past ones are located.

Zyang: Hello, what's the best time to see it in Colorado?

bill_cooke: After midnight.

Kevan: where is the Ustream camera from, Huntsville, AL?

bill_cooke: Yes.

CodyMichael1234: What is your favorite storm and what year was it?

bill_cooke: 2001 Leonids.

DRHumpCanada: Rhiannon: Same question... which shower was your favourite and why?

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rhiannon_blaauw: 2012 Perseids. Just a beautiful clear night here in Alabama and after I was done the meteor chat I was able to go observe them myself for a while and saw a whole lot of them. I also had a great experience with the Perseids in 2008 or 2009. I just slept underneath the night sky that night - brought an air mattress outside and watched them all night. The Perseids being in August makes it much nicer to be outside in the middle of the night! Even in Alabama it is chilly in December. ☺

Kevan: why isnt the camera feed clear? its kinda blurry on my pc

bill_cooke: Clouds.

DRHumpCanada: From one Londoner to another, thank you for helping us all understand more about meteors and othe celestial bodies!

bill_cooke: You're welcome!

gemini83: hmm ok, i had most of the transcripts but a hard drive crash erased all that, Ive just asked alot of questions in the past that Id like to revisit, Bill I have learned a plethora of knowledge thanks to you, i appreciate your work sincerely

bill_cooke: You're welcome!

Nico: Why is there so much interference in the live stream

rhiannon_blaauw: What you are seeing may be clouds. It is a fairly cloudy night here still.

mari2252: So exciting! I just saw I big one in Evans, GA :)

rhiannon_blaauw: Happy for you! Have seen several in the feed already.

1AngelSoria1: what time are displayed meteorites ?

bill_cooke: The meteor shower is going on right now.

Camas_WA: How big are the particles that create the meteors?

bill_cooke: About a millimeter.

Ahdler: when starts in Nicaragua, I've seen a few here!!

bill_cooke: It's already started

gemini83: I hope you guys get paid overtime to do these chats because with all the typing there is no way yall get to see very many :(take a night off, Bill!! lol

bill_cooke: I work for the Gov't - I don't get paid overtime...

Camas_WA: And how fast are the meteors traveling?

bill_cooke: 78000 mph.

coyotito911: at what time, i can see the geminids?

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bill_cooke: Best rates after midnight.

Kevan: the metors come from an Oort cloud, right? (or is that comets?) :)

bill_cooke: Comets come from the Oort cloud.

CodyMichael1234: Are you guys researchers or whats do you guys do at your job?

bill_cooke: Yes, we're researchers.

Alsniper: how is the speed of the meteor determined?

bill_cooke: We measure it by triangulation or by radar.

gemini83: lmao...im gonna have to talk to your bosses about that, you are here every single shower, will u request next outburst or storm off?? also Leonids in 2032,33, and 34 will be predicted storms or no?

bill_cooke: As far as Leonid activity in 2032, we haven't looked that far ahead

ctoalson: when is the best time for jacksonville fl

bill_cooke: After midnight.

Cristina: In this Ustream feed, from which side will they appear?

bill_cooke: They will move from right to left.

1AngelSoria1: At that hour could see meteors ?

bill_cooke: Yes.

badriri: How did the comet become extinct?

rhiannon_blaauw: It is possible that after orbiting around the sun for many, many years that all its ice had been melted away by the sun and what was left was just the rocky part that we now know as Phaethon. Phaethon comes very, very close to the sun - 0.14 AU (much closer than even Mercury), that is why it was named after the Greek myth of Phaeton, son of the sun god Helios.

K22A: Massive one on your live feed. Well done NASA! :)

rhiannon_blaauw: Awesome! Glad we are getting some breaks in the skies.

Ahdler: how frecuently are these meteors????? :O

bill_cooke: At the peak - about one every couple of minutes.

mondo1999: do you work with NASA? is that a good company?

bill_cooke: Yes, and yes!

Dan: So, is this a comet breaks down into small milimeter pieces, and those pieces go into our atmosphere and vaporize which is then defined as a meteor?

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bill_cooke: These are pieces shed from the asteroid. You are right about the atmosphere part.

Alsniper: are the same methods used to determine the actual size of the meteors?

bill_cooke: You can tell the size of the meteor from its brightness and speed.

Walter: other days or years you can see again the Geminid Meteor Shower ?

rhiannon_blaauw: The Geminid meteor shower occurs every December! The peak is always around December 14. You can see Geminids in the nights before and after that, but the rates are always much highest on the peak night.

RichP: ya i see what poeple are talking about it looks like a video from the 1940's lol it is verry choppy i thought the leonids are every year?

bill_cooke: Leonids are every year, but they only storm once every 33 years.

Isra: Can I see the geminids in Mexico, D.F?

bill_cooke: Yes, if it's clear.

Ashley: Same for Bradenton/Sarasota area, I'm guessing?

bill_cooke: Correct.

Rebjbre: What about Seattle, WA?

bill_cooke: After midnight.

Camas_WA: How is it possible for a 1 millimeter particle 60 miles above earth and traveling at 78,000 mph to create enough light to be seen be seen from the ground?

bill_cooke: Because a one millimeter particle travelling at 78000 mph has a lot of energy that can be converted into light.

Peter: is there a slight chance that one of these could make it to the ground or none at all?

rhiannon_blaauw: No Geminid has ever made it to the ground. Most ablate by 50 miles above the Earth's surface, but they have been recorded as low as 22 miles.

Kevan: how often does a metor shower occur?

bill_cooke: There are meteor showers every month but most have very low rates and are not that noticeable.

Spaceman: What about Ottawa, ON?

rhiannon_blaauw: Yup! You will see them in Ottawa if your skies are dark and clear.

Jeee: is geminid dangerous???

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bill_cooke: No.

jeee: People say to turn off phones because of the radiation. are they right?

bill_cooke: No - meteors are not radioactive.

Periapsis: When we see a bright, long duration meteor, are any colors due to the atmosphere or elements present in the particle itself as it vaporizes?

bill_cooke: Colors are caused by the particle ablating and the excitement of atmospheric molecules caused by the meteors passing.

Daniela: What about Peru? Bill_cooke

bill_cooke: Yes, you can see Perseids from Peru.

Stars: Have there gradually been more and more visible debris as the years have gone on?

bill_cooke: No.

Camas_WA: What are the meteor particles made of?

bill_cooke: Bits of ice and dust.

geminis83: why is this the only major shower that comes from an Asteroid?? no other asteroids are big enough or leave enough debris in our orbital path orr?? I never understood that, also why do some call it a "Rock Comet" im not familiar with that term

rhiannon_blaauw: Comets generally produce more meteoroids than asteroids because they are ice and rock, and the ice melts away when it gets close to the sun, releasing particles. Thus most meteor showers are from comets. Asteroids are rocky bodies, not icy, and thus not as active (do not release as many particles). The asteroids that cause meteor showers may have been more active in the past, though. The Quadrantids also come from an asteroid and they peak in earth January.

stars2: Just went out to see if i could see any meteors....saw nothing :(

bill_cooke: You need to spend at least an hour outside.

Rebjbre: The geminids happen each December...what determines this event?

bill_cooke: The Earth encounters a stream of debris left behind by an asteroid at this time every year.

Bjorrek: one thing im curious about, when will haileys comet be back?

bill_cooke: 2061.

Guest54321: What is (or was) the best time for mid Michigan and where is the live feed camera located?

bill_cooke: Around 2 am and the camera is in Huntsville, AL.

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Alsniper: bill: how annoyed are you with having to constantly answer "after midnight" or "2am"

rhiannon_blaauw: That question may be getting a bit old... but he is happy to have lots of people interested in the shower, I'm sure! ☺

spaceman: Bill how long have you worked with NASA?

bill_cooke: 20 years.

Gejb3: You had mentioned earlier that the meteors came from an astroid..where is the astroid now? is it orbiting Earth

bill_cooke: It is orbiting the sun and is currently nowhere near the Earth.

Kevan: if the skies were clear here where i live in Ohio, (which they arent) how many metors would i probly see, over, say, a 30-45 min period?

bill_cooke: You would see about one/ minute.

Donald: So are we going through this or is this passing us and giving us a show?

bill_cooke: We are going through it.

stars2: How often are meteors apprearing on the stream/feed? I havent seen any yet :(

bill_cooke: You will have to look for bit to see meteors on the live feed, the weather sucks here in AL.

spaceman: did y'all like interstellar? was it stellar or nah?

bill_cooke: Haven't seen it.

RichP: what is the differnce between a storm and a shower and how do you determain that? and when is the next storm?

rhiannon_blaauw: A meteor storm is when we see over 1,000 meteors an hour. The next meteor storm predicted are the Leonids in the 2030's. We can predict them by doing simulations of the meteor stream orbiting around the Sun, adding in anything that affects the stream, such as gravitational pull from the planets.

DRHumpCanada: Rhiannon: you mentioned the 2012 Perseids was your favourite shower... where were you observing it from at that time? At Marshall or back here in Ontario CAN?

rhiannon_blaauw: I was here at Marshall. ☺ I moved here in 2010.

DRHumpCanada: Bill: Same question for the 2001 Leonids... where were you when you were observing it? Also, what instrumentation did you have for measurements with you?

bill_cooke: Hawaii and had several portable cameras with me.

cashley: is it going to be easy to see the shower in a well lit suburb?

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bill_cooke: Nope. Need to minimize those lights.

geminis83: yea Quadrantids have been washed out by moon so many times lately it seems I rarely get a good shower out of that one, thanks for answer tho Rhiannon, now is there a way we can hide the moon during these events??? ;)

rhiannon_blaauw: I wish! If you figure out a way, let us know ☺ The moon is so beautiful, but it does make meteor-shower-observing, more difficult!

Calebj: What direction should I be looking in to see the most meteors?

bill_cooke: Look straight up.

Alsniper: what is the orbit of the meteor around the sun relative to the orbit of the earth around the sun

bill_cooke: You will need to google this – can't draw in a chat room!

jason444: Hi I went outside and looked towards constellation gemini and watched for about 10 minutes and saw no meteors, yet. I Was just wondering where i should be looking im in central new jersey and the sky has cleared up alot.

bill_cooke: Need to look longer than 10 min - need to give eyes time to dark adapt.

Kevan: im thinking about buying a new telescope for stargazing; any suggestions as to what i should get?

bill_cooke: Nope - I suck at hardware.

Eric: About how long does it take for one to go across the sky? Do they go all the way across?

bill_cooke: Couple of seconds.

Don: been seeing a lot hear in big bear lake calif

bill_cooke: Congrats!

Jeee: can I observe it form west palm Beach?

rhiannon_blaauw: Yup! If your skies are dark and clear.

Spaceman: what happens if i look straight down

bill_cooke: You will see a lot of ground.

Jeee: Can I observe it from West palm beach?

bill_cooke: Yes.

RichP: this is off topic but since you work for NASA do you belive there is life on other planets/moons anywhere?

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bill_cooke: Probably.

Eric: How frequently will you see them tomorrow night?

bill_cooke: Rates will be less than half what they are tonight.

Camas_WA: Do you know, or have a best guess, as to the chemical composition of 3200 Paetheon?

bill_cooke: No.

spaceman: Are you besties with Chris Hadfield? Here in Canada he is our God.

bill_cooke: Nope – don't know him.

Bubon: Can you see the shower in NYC or surrounding areas?

bill_cooke: If it's clear and you are away from city lights.

Katinka: Not a question, but thanks for the live feed! The sky is completely overcast where I live.

rhiannon_blaauw: You are welcome. Hopefully it will get more clear as the night goes on.

Eddcast: Where I am, I just saw around 5 in a span of 2 minutes. Do the amounts vary at some points?

bill_cooke: Yes, they do. Sometimes you see several in quick succession.

Cristina: In this Ustream feed, from which side will they appear?

rhiannon_blaauw: Meteors will appear all over the feed, but Geminids will be travelling right to left, specifically travelling to the lower left of the screen.

stars101: if its misty, i wont be able to see the meteor shower will i?

rhiannon_blaauw: If it is raining, no you cannot see the meteor shower. The skies need to be clear.

SinderMoonStar: are you going to be chatting all night?

bill_cooke: No - we go just over 2 more hours.

stars2: Based on the location where the feed is from, when will the rates be best? like right now? or in an hour or something?

bill_cooke: Around 2 am.

enb1980: Kind of a noob question here, but -- is the video feed "staticky" for anyone else? It's like bad reception on a TV using an old rabbit-eared antenna for me.

rhiannon_blaauw: It is cloudy which often looks like noise.

Bubon: Can you see the shower NYC or in surrounding areas?

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rhiannon_blaauw: Yes, if your skies are clear. It would be best to be as far away from city lights as possible.

Bubon: Can you see the shower in nyc or surrounding areas ?

bill_cooke: If it's clear and you are away from city lights.

Bubon: Do you have any suggestions of where to go?

rhiannon_blaauw: Away from city lights! Lie on your back and take in as much of the sky as possible. Let your eyes adjust to the dark for a while.

DRHumpCanada: After tonight's shower, how long will you spend analyzing the data collected to report out the actual rates observed by Fireball?

rhiannon_blaauw: That is highly dependent. We are not giving an answer for that. ☺ We try to farm the analysis out to people north of the border, if possible. ☺

Alsniper: will there be a file with this chat posted?

rhiannon_blaauw: Yes, a transcript will be posted sometime next week.

Spaceman: Oh, Neil degrasse Tyson then right?

bill_cooke: Don't know him either.

Diclei: saw that one

bill_cooke: Congrats!

Eddcast: Hey Bill, do you work for NASA?

bill_cooke: Yes.

Camas_WA: Did you follow the European Space Agency's recent landing of a Rosetta drone on a comet last month?

bill_cooke: I haven't had too much time, but it's a major accomplishment!

burtonjos35: At what rate are the meteors going to fall tonight?

bill_cooke: At the peak - about 1 every minute or so.

Jerem: Is the "rain" of tonight could be dangerous for the ISS?

bill_cooke: No - the ISS is armored.

Jeff: Since we are looking at the same sky do we all the same meteor where ever we are?

bill_cooke: No - people can see the same meteor if they are 200 miles of each other.

HKHoang: How come the Geminids are always around this time?

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bill_cooke: Because the earth runs into the stream of debris from the asteroid at this time of year.

Jpancake: My son and I watched the sky for a little over an hour just outside of Grant, Alabama 8:15 to about 9:30. We saw around 30 meteors. Pretty cool.

bill_cooke: Congrats!

tyler_kinne: when is the predicted peak?

bill_cooke: Around 2 am local time.

burtonjos35: At about what size are the meteors that going to be entering our atmosphere?

bill_cooke: About a millimeter.

i_uh_likemeteors: Where are y'all watching from?

bill_cooke: We are in Huntsville AL.

Nano: Bil, I'm from Honduras, I can see the Geminids?

bill_cooke: Yes.

DRHumpCanada: How involved is Western with Fireball? And in what capacities are they involved?

rhiannon_blaauw: They developed the software that is used on all the all-sky and wide-field cameras. Are you going to reveal your identity to us at some point during the chat? We are curious.

enb1980: What section of the sky are we looking at? Also ... East is left, right? #bumpkin

bill_cooke: We are looking northwest - east is to the right.

Isra: Can I see something like this in the future? I can not see anything right here in Mexico :(Thanks for the room chat and the Ustream feed

rhiannon_blaauw: You are welcome. If your skies are dark and clear, you should be able to see Geminids!

Camas_WA: If you had a chance to go on the first manned mission to Mars, would any of you go?

bill_cooke: I wouldn't. I hate heights.

Jeee: What is it exactly? and how dangerous it is for human being?

bill_cooke: Geminids are not dangerous.

Mfdpa: Not seeing much in Atlanta. Too much light pollution I guess.

rhiannon_blaauw: That is too bad. We are starting to get some bigger breaks in our clouds so we should be seeing more Geminids in the feed if our skies continue to clear!

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Kalidoscop3yes: does the difference in composition of elements between asteroids and comets affect the way we see a meteor shower? I.e; if it had a high amount of magnesium would we see blue on entry? or is it just all the same?

bill_cooke: The composition of the meteor can influence its color but a big factor is that humans see colors differently. For ex, some of my friends would say that the Geminids have a green tint, whereas I think they look white.

Soojung: How long is the meteor Shower expected ?

bill_cooke: It will last for a few more days.

jason444: Saw at least 10 geminids in about 20 minutes here in NJ!

bill_cooke: Congrats!

Doug_W: cooke, you're like a super hero

bill_cooke: Actually, I'm Batman!

Jeff: What movie do you like best..Armageddon or Deep Impact?

bill_cooke: Deep Impact.

matt43: About how fast do they travel?

bill_cooke: 78,000 mph.

MM: From CO. What direction should I be looking ?

bill_cooke: Straight up.

Jerem: Thanks Bill, could you be more specific? The meteorites reaching earth tonight are going slow enough to be stopped by the ISS armor? I mean, a very fast one could breach any space armor isn't it ? Or is it because they are so small, they don't have a strong potential energy?

rhiannon_blaauw: The ISS is armored with 'stuffed bumper shields' that can protect against meteoroids up to 1" (2.5cm) in diameter. So a bigger one could breach the ISS, however those are very rare.

Epsilon: When is the next major meteor shower?

bill_cooke: Quadrantids in early January.

MM: Thank you, Bill

bill_cooke: You're welcome.

brian22n: What is Fireball that I keep hearing about in chat?

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rhiannon_blaauw: A fireball is a bright meteor. 'Fireball' can also mean fireballs.ndc.nasa.gov - the website in which the results of our all-sky cameras are posted every morning. You can go to this site over the coming days to see lots of Geminids that our all-sky cameras detected!

Jeee: Can People see it from Haiti?

bill_cooke: Yes.

Isra: There are a lot of pollution, i guess. I just see clouds and few stars in the skies. How big the meteors are? I need a powerful telescope or something to see the shower (I guess the next major shower because there are not hope with Geminid in Mexico DF)

bill_cooke: You only need your eyes.

i_uh_likemeteors: So when you say the peak will be around 2 am, is that Eastern Time?

bill_cooke: Local time.

jeee: how far is this phenomenon from the earth?

bill_cooke: Geminids burn up 50 miles above your head.

Dan: Has NASA named most of the visible stars visible to the naked eye and counting?

bill_cooke: No.

Alsniper: what % of meteors actually make it to earth? and how many cause damage upon impact?

rhiannon_blaauw: Very, very small number - small fraction of a percent. Very, very few cause damage upon impact. You may recall the meteor that occurred over Chelyabinsk, Russia in February, 2013. That one caused damage.

Norella: How about St George, UT?

bill_cooke: After midnight.

Jerem: Did MIR was vulnerable to those little meteorites? Have we made good progress on that subject?

bill_cooke: MIR has shielding as well. Not as much as ISS.

Daniela: What's the most interesting thing about meteors for you bill?

bill_cooke: The fact that they have spent millions of years in space and finally do a kamikaze into Earth's atmosphere.

matt43: What exactly does the "peak" mean?

bill_cooke: The time of the best rates.

Doug_W: Is it too late to view in Virginia Beach, VA?

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bill_cooke: No.

TycoBrahe: What is the expected life expectancy of 3200 Phaethon?

bill_cooke: Life of the solar system.

Kevin: I just seen some here in Greenwood, Ms. They were beautiful. the skies are very clear here. This has to be what me and my sister used to see during this time every yr in the 90's. she is fascinated with stars and science also. Glad I got to see the meteors.

rhiannon_blaauw: Awesome! Glad to hear good reports 😊

kitchen_wolf: well it's been fun. Thank you for the information..

bill_cooke: You're welcome.

mondo1999: is the peak happening now? i have seen some!!

bill_cooke: Congrats!

Wagner: The Moon is up now! It gets harder to see from now on?

bill_cooke: Yes, the moon light will interfere.

gemini83: was just outside for almost 20 minutes, saw over 20, around 10 really good ones too.....% % % % i love this stuff :)

bill_cooke: Congrats!

Kalidoscop3yes: are these good wishing shooting stars?

bill_cooke: Jiminy Cricket assures me they are!

b4evrwld: Wow just saw one on the feed :)

bill_cooke: Congrats!

Nano: I can see another!

bill_cooke: Congrats!

medulla_oblongata: what made you want to work at nasa? how were you originally inspired?

bill_cooke: Always was a nerd - NASA seemed like the best place to go.

DerkaDerka212: Is the meteor show visible in california?

bill_cooke: Yes.

DRHumpCanada: Too bad there is very heavy cloud cover in southern Ontario... big thanks to MSFC for streaming this amazing cosmic light show... and it's only just beginning!

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rhiannon_blaauw: That is frustrating! We are starting to get clear skies here... hopefully it just gets clearer. And you are welcome, thanks for joining us. ☺

Jerem: Every year we are crossing the paths of those little guys. How is it possible that a lot of them are still crashing into earth. Is there so many of them? (like a very gigantic number) Do we have an idea how many of them there are, and for how long we will encounter them?

bill_cooke: There are lots of Geminids and we have no way of counting them.

i_uh_likemeteors: How long have you been working for NASA, Bill?

bill_cooke: 20 years!

Debby: Is there a lot of static, what looks like raindrops, covering the live stream? While the stars flash on and off - twinkling? If we were outside, what direction do we look in the sky? The moon is very bright - half moon.

bill_cooke: Look straight up, away from the moon.

HKHoang: Would the northern lights interfere with viewing these?

bill_cooke: No.

matt43: could people on the ISS see them well?

rhiannon_blaauw: Yup! They can see meteors by looking down towards the Earth, instead of up towards the sky!

Nano: How long have you been working for NASA, exactly, what are you job? *Rhiannon_blaauw*

rhiannon_blaauw: I have been working at the Meteoroid Environment Office for over 4 years now. It is a fantastic job.

Alsniper: bill, have you been a researcher your whole career at nasa?

bill_cooke: Yes.

MM: Just seen 8 of 'em in about 7 min. here in the Denver area. |*(retty cool. Got me Brother out of bed. He didnt think we were gonna see anything. This is gonna be better than the last shower I watched. :)

rhiannon_blaauw: So glad!!

Jerem: Dr Cooke, thanks a lot for your answers. I'm not even a US citizen, and you took the time to answer me, merci! Keep up the good work ;)

bill_cooke: You're welcome

DRHumpCanada: So, if we watch the ISS views (if the right camera on board is enabled), we can see the exact opposite view of the one we're seeing here?

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rhiannon_blaauw: It wouldn't be looking at the exact same field of view. We are just seeing a small part of the atmosphere over Alabama. The ISS view (if enabled) would be over a large portion of the Earth.

George_McFly: Anyone know what part of the sky is the Marshal Camera looking at?

bill_cooke: It's looking at the NW.

burtonjos35: Do all the impacts add to the mass of the earth?

bill_cooke: Not significantly.

Dhaval_M: Where is the best place to see this happening?

bill_cooke: Any place with a clear dark sky.

Periapsis: Will you be examining the test tiles from Orion which were drilled to simulate micro-meteoroid/space debris damage?

bill_cooke: No.

gemini83: what a show.....have seen alot seems like the majority i see are in the northwestern portion of the sky.....WOW

bill_cooke: Congrats!

George_McFly: Roughly what constellation is it looking at?

rhiannon_blaauw: I am not sure right now. It is pointed about 55degrees elevation and 305 degrees azimuth if you want to look it up ☺

W4WDT: I was outside for about the last 20 min or so and saw at least 25 in Baxley, GA...this is what it's all about! Awesome!!! Probably been asked already, but what's the peak viewing time for the my area?

bill_cooke: Around 2 am and congrats!

Dhaval_M: What is the best time to see these in Mississauga?

bill_cooke: If it's clear, around 2 am.

Selbstgenügsamkeit: have you ever seen UFO's?

bill_cooke: No.

Alsniper: bill and rhiannon, are the two of you stuck inside answering all of our questions all night, or will you get to go out and see some of the shower?

bill_cooke: We will be able to watch the video from our cameras.

Isra: In the ustream feed, how can I know when I'm seeing a meteor ? Should I be seeing a kind of spotlight, twinkling?

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bill_cooke: It'll look like a streak of light.

SinderMoonStar: Just saw on in CA

bill_cooke: Congrats!

DRHumpCanada: Do you two also study meteorite impacts on earth? If so, describe the best sample you've been able to examine. Thanks!

rhiannon_blaauw: We study the particles ablating in the atmosphere as meteors, not meteorites. However we have both been able to hold many meteorites - so cool holding rocks which were recently in space! One of my most memorable ones was when I held a lunar meteorite - a meteorites that came from a piece of the moon.

Alsniper: are the videos/recording of these showers useful in your researches at all? or are they just for viewer pleasure?

bill_cooke: The live feed is not, the video from our other cameras are.

Nano: the best time to see these in Honduras? I'm understood that it seen all the world?

bill_cooke: Around 2 am - and yes, it is seen all around the world

Dhaval_M: What is the cycle for this event? Does it happen like every 20 years?

rhiannon_blaauw: Every December!

bill_jackson: Chandler, AZ spotted one.

bill_cooke: Congrats

burtonjos35: I have a follow up question to my last one.. How long would it take to make a .000001% increase in the earth's total mass with just this meteor shower?

bill_cooke: Longer than the lifetime of the solar system.

Fpalma: Is the live feed being recorded for future playback?

rhiannon_blaauw: Yes, it is.

enb1980: Meteorites come from the Moon, too? Why? Also, how often and at what rate?

bill_cooke: They are very rare and no one has estimated the frequency of their fall.

Dhaval_M: Can we expect Hale-Bopp's comet to return?

bill_cooke: Not for tens of thousands of years.

burtonjos35: Thank you Bill.. :)

bill_cooke: You're welcome!

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CarolinaAu: I actually got to see several meteors this time! Clouds interfered with every one for over a year.

bill_cooke: Congrats

Alsniper: what causes lunar meteorites? asteroids/ meteors colliding with the moon?

rhiannon_blaauw: Exactly. When particles hit the moon, pieces of the moon can shoot off and if moving fast enough, can escape the moon's gravity. Some of these particles have then come to the earth as meteors/meteorites. Very rare, and very cool.

Jobrian: I don't know where to look in the night sky to see them...

bill_cooke: Look straight up.

Dhaval_M: Is Luna part of Mercury or is that just a hypothesis?

bill_cooke: Luna is the moon so, no, it is not part of Mercury.

Gossed: I may be late to the party, but I am located in North Alabama 80ish miles ESE of Huntsville. My wife and I were in a low-light area pre-moonrise and seeing meteors in burst of 5-10 per minute heading east to west I believe. The long burning ones were green in color and moving at a similar speed. Between 1125 PM Central time and 1130 PM Central time we saw a very bright long burning red/orange fireball travelling west to east just below Orion. Any idea what the oddball was?

bill_cooke: Sporadic or background meteor.

Ab: Moderators Please Answer My question Before time Runs Out....Im in PAKistan and its Mornings 11Pm How can I see them

bill_cooke: You can't see Geminids in the daylight.

DRHumpCanada: Do you two often work with astrogeologists to determine the elemental makeup of the meteors you're observing?

bill_cooke: No.

enb1980: I guess the feed is too cloudy to see any now, eh? My daughter and I saw a nice one a few minutes ago, though!

bill_cooke: Congrats!

tyler_kinne: is there any events next year that wont happen again for awhile such as seeing hale-bopp's comet?

bill_cooke: Perseid outburst in August.

matt43: are comets rare if you see one?

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rhiannon_blaauw: It is very rare to see a comet with your naked eye. However comets are all over the solar system, but most are just too dim to see without a telescope.

Ab: so bill i know this but does that mean i won't be able to see them at my night time too it will be night here after 6 hrs

bill_cooke: You will be able to see Geminids after it gets dark, if there are no clouds.

tyler_kinne: can you tell me a bit about the perseid outburst?

bill_cooke: Rates approaching 200/hour in mid-August of next year

Sammy: yeah they're streaking from all over, im actually having the best luck gazing in the direction of orion, since its easy to spot and near gemini

rhiannon_blaauw: The meteors are seen all over the sky and are best seen when taking in as much of the sky as possible...but also best not to look directly at Gemini.

DRHumpCanada: I'd think knowing their composition would be useful to studying their origins. Am I off base on that?

bill_cooke: Nope - you're not wrong. However, I am no geologist and I hate chemistry.

Dhaval_M: Is it possible for a comet or asteroid to be coming our way from the asteroid belt?

bill_cooke: Not very likely.

CarolinaAu: Tonight, the meteors came from three different directions, east to west, south to north, and from the south east. to the north west. Is this normal for the Geminids?

bill_cooke: Yes.

Dhaval_M: I wanted to know this for quite some time. When will we have another solar or lunar eclipse?

bill_cooke: Not an eclipse person - Google will give you your answer.

Mprzy: I just saw my first ever two meteors at once. Has anybody seen that before or even more? 3+?

rhiannon_blaauw: Yes double-meteors are fun! I'm not sure if our all-sky cameras have seen 3+ at ones, but I'm guessing that during the Leonid meteor storms, that was not unheard of.

Nano: sorry for my english....the new horizons go to pluto??

bill_cooke: Yes, New Horizons arrives at Pluto this July!

Alsniper: do members of the general public have access to photos taken by your all-sky cameras

bill_cooke: Yes - go to <http://fireballs.ndc.nasa.gov>

burtonjos35: Any plans for the moon europa, anytime soon!?

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bill_cooke: No.

Dhaval_M: I found entire dates of solar eclipses! The closest will be in March 20, 2015!
<http://www.timeanddate.com/eclipse/list.html>

bill_cooke: Congrats!

Dhaval_M: Do you know how the Dawn mission is going?

bill_cooke: Last I heard, very smoothly. On the way to Ceres.

burtonjos35: Does Pluto have a moon?

bill_cooke: Pluto has 5 moons

Alsniper: what time is it in Huntsville?

bill_cooke: 12:45.

Dhaval_M: Dawn just did the fly pass with Mars right?

bill_cooke: No, Vesta.

burtonjos35: Really how much do we know about them? AND is there somewhere in the NASA website that I can find out for myself?

rhiannon_blaauw: fireballs.ndc.nasa.gov is a website which shows the results from our all-sky cameras

DRHumpCanada: Bill: there's lots of photos from the 2001 Leonid shower, but photos only tell a part of the story. Can you describe for us what that shower was like? And were you as giddy as a schoolboy?

bill_cooke: No - I was not giddy, but the shower was spectacular from Maui. Many fireballs.

enb1980: Are any of the Geminids expected to survive atmospheric descent? If so, will NASA send out anyone to try and track some down?

rhiannon_blaauw: No - the lowest Geminids burned up 22 miles above the Earth's surface, but most burn up by 50 miles up.

Vohpoh: are there any good meteor showers forecasted for the future?

bill_cooke: August 2016 – Perseids.

burtonjos35: No I mean about the moons of Pluto. Rhiannon_blaauw. Is there a place in NASA's website that has facts that we know about Pluto's five moons?

rhiannon_blaauw: I would recommend just Google-ing that. ☺

Alsniper: bill and rhiannon. thanks so much for all the information tonight, enjoy yourselves.

rhiannon_blaauw: You are so welcome! Thanks for joining us. ☺

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DRHumpCanada: Rhiannon: Same question about the 2012 Perseid shower, please!

rhiannon_blaauw: Well, I did one of these NASA chats for the first part of the evening, but I remember hearing amazing reports of what was going on outside, so I took a peak now and then and saw quite a few meteors between answering questions. Then when I went home, I grabbed a blanket and just spent the rest of the evening lying on the grass, enjoying the shower myself. I saw quite a few that evening. I just remembering it was such a mild night, along with being very clear. ☺

burtonjos35: Thank you rhiannon_blaauw... :)

rhiannon_blaauw: You are welcome!

Dnmaloney: How do I know if I am far enough away from city lights to see the show?

rhiannon_blaauw: If you can see the stars of the Little Dipper, that is a good sign that your skies are dark enough and that your eyes have adjusted to the dark.

JamieLorraine: I love meteor showers. Was just outside with my daughter watching. It's cloudy here in Madera, Ca, but there was some nice, big breaks in the clouds so we were able to experience some! We were out there for about a half hour and counted 8. :)

bill_cooke: Congrats!

enb1980: Yes, thanks for answering our questions Bill and Rhiannon! Incidentally, did you guys send chris_bowerman out on a pizza run? Maybe someone should shoot him a text, just to make sure he's ok ...

rhiannon_blaauw: He is the guy who runs the server, he isn't here to answer your questions.

matt43: how big are the meteors?

rhiannon_blaauw: These meteors are caused by meteoroids that are only centimeters or millimeters across!

Dhaval_M: If we were to have an imminent asteroid impact. In your guys's opinion, what would you do?

bill_cooke: Define imminent.

burtonjos35: 5 moons Cooool...! Thank you bill and rhiannon

bill_cooke: You're welcome

Dhaval_M: Well, a deadly impact from an asteroid that is 3000 km in diameter.

bill_cooke: That's not an asteroid, that's a planet.... and there are no such things.

erick_jimenez: How far are these asteroids from Earth? :)

bill_cooke: Geminids burn up 50 miles above your head.

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5253h: I am not seeing anything yet, have I missed it or is it just not peaked yet?

rhiannon_blaauw: The feed has gotten cloudy again. ☹

enb1980: @bill_cooke:: Deep Impact over Armageddon? ... Really? Was it because Deep Impact seemed more scientifically feasible? Or are you just not an Affleck fan?

bill_cooke: Deep Impact because it was more scientifically realistic.

DRHumpCanada: Bill: Love the knowledge you impart, and the humour to go with it is an added bonus! I'll be back for another one of these NASA chats - very entertaining and informative!

bill_cooke: Thank you.

Alv: just a question, the meteors are only near of the gemini constellation or in other areas of th sky also can be viewed, im askin because on this suburb i only can see the area between the gemini and ursa major area

bill_cooke: You can see Geminids anywhere in the sky.

CLK: Clear skies in Auburn Alabama. I saw 5 meteors within 10 min or so.

rhiannon_blaauw: Wow, that's great! Can you push those clear skies up for us? ☺

erick_jimenez: Woo I find this very intereseting. By the way, can you tell me exactly the difference between an asteroid and a meteor? I get very confussed evertime

bill_cooke: If the rock is bigger than a garage then it's an asteroid.

Mypaperpast: might be clearing up here in Houston again soon...have already seen quite a few tonight

rhiannon_blaauw: Awesome ☺

enb1980: If a garage-sized asteroid impacted with the Earth, how much damage would it do? More specifically, beyond what size are we getting into ELE scenarios (Deep Impact reference)?

bill_cooke: Garage-size rocks would not make it to the ground - so no damage. But pieces in the form of meteorites would make it to the ground. You would need an asteroid a mile or so across to cause mass extinction.

Vohpoh: do we ever have any meteorites or asteroids who's origin is outside the solar system / ort cloud?

bill_cooke: No

mypaperpast: what causes the differnet color burn of these geminids...i've seen mostly greenish...but some blue and redish

bill_cooke: Composition and atmospheric ionization.

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Lan: can u see it without telescope ?

bill_cooke: Yes, with your eyes.

enb1980: Well, the feed is completely blanketed in clouds, now, so I guess I'll head off. Thanks again Bill and Rhiannon -- hopefully the next shower will hit with clearer skies! Regards,

bill_cooke: You're welcome!

Mypaperpast: so do i get one big wish or a bunch of little wishes for all these shooting stars

bill_cooke: One wish per shooting star!

rhiannon_blaauw: We are not getting as many questions, so we are going to shut the chat down at 1:30 CST (2:30 EST)... if anyone has any final questions they would like answered, send them along! We hope the lack of questions means that people are out, seeing Geminids. ☺

matt43: When is the peak for my time if I live in california?

rhiannon_blaauw: 2:00 local time, until dawn.

Vohpoh: No, but thanks as always. ONE day, there will be a meteor shower and michigan will not be overcast :)

rhiannon_blaauw: Yes, one day there will be! And you are welcome.

burtonjos35: will the New horizons mission pass by the moons of pluto as well?

bill_cooke: It will close to them, yes.

vohpoh: Do you guys have another webcam feed we can look at that isn't overcast?

rhiannon_blaauw: Unfortunately, any of the cameras that can go on the feed are located at Marshall Space Flight Center, and it is cloudy here.

burtonjos35: cool take lots of pictures.. OK!?

rhiannon_blaauw: Check out fireballs.ndc.nasa.gov, tomorrow, to see Geminids seen by the all-sky cameras!

erick_jimenez: At what hour is the meteor shower going to end? :o

rhiannon_blaauw: It will continue on for the next couple nights, but the rates will be a lot lower tomorrow night.

burtonjos35: I really appreciate you and Nasa for doing this? :)

rhiannon_blaauw: We enjoyed it! Thanks for joining us.

Blush: i'm in Birmingham. Just went outside and only saw 2. Did I miss most of them?

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rhiannon_blaauw: Fantastic! Nope, keep looking and you should see more as the night goes on.

matt43: My neck starts to hurt looking straight up at the sky, should i get a blanket or sleeping bag?

rhiannon_blaauw: Sure. Should help keep you warm, too.

bill_cooke: Thanks to all of you for all the great questions, and thanks to our guest scientists, Bill Cooke and Rhiannon Blaauw! Check back in the next day or two for a posted transcript of today's chat. Have a great Sunday.

Vohpoh: I don't if there's a good scientific reason to do this but, for another time : send a camera up on a balloon and record the view from up there with an ultra wide angle lens. It might be really cool.

rhiannon_blaauw: Actually has been done! Good idea though.

rhiannon_blaauw: Thanks, all, for joining us! Hope you get some clear skies over the coming hours!

Moderator_lee: Okay, guys, the questions appear to have come to an end, so we're shutting down early tonight. Thank you all for your participation and we hope all of you get a chance to see meteors. Remember that the Geminids meteor shower should be visible for the next three or four nights.